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## THE RELATIVE STABILITY OF GOLD AND SILVER.

During the monetary discussion of the past decade, the question most persistently discussed has concerned the relative merits of gold and silver as standards of deferred payment. Ostensibly the comparison is made between the single standard of gold, and the double standard of gold and silver. But since this "joint standard," under existing conditions, can hardly be established, the real issue is between gold and silver—which metal is the more stable in value?

Any discussion of this question must rest upon an analysis of the value movements of the two metals as expressed in tables of prices. We have first to determine the meaning of the expression "stability" as applied to the value of a standard of deferred payment. In the second place we must find a formula by means of which the material presented in tables of prices can be made to show which of the two metals has, in fact, manifested the greater stability of value.

It is generally agreed that an ideal standard of deferred payments would exact from the debtor at the termination of the contract the same purchasing power which was received from the creditor at the beginning. That authoritative statement of monometallic doctrine, the final report of the monetary commission, gives its unqualified approval to this criterion, which is popularly supposed to be unfavorable to the single gold standard; "In order to work with perfection as a standard for deferred payments, the article chosen as that standard should place both debtors and creditors in exactly the same relative position to one another at the end of a contract that they occupied at the beginning." By this criterion we propose to determine the relative

stability of the precious metals since 1873, when the tie between them was broken by a combination of influences, legislative and industrial.

Contracts may be broadly divided into commercial agreements, generally completed within three months, and permanent obligations whose duration is from a few years, in the case of a farm mortgage, to many decades in the case of a national debt. The necessity for interest payment brings these obligations of the second class to a certain extent within the first division. In normal cases, the borrower of capital for industrial purposes will receive a series of increments of return from its investment, and out of these he has agreed to return to the lender another series of increments in the form of interest payments. Every obligation of this nature may be considered either as a series of short contracts, or as a more extended agreement composed of these contracts and involving in some cases the return of the principal. In the vast majority of cases, however, especially with national and corporate obligations, no return of the principal is made or expected. Successive conversions and renewals perpetuate the principal and the question of the standard can concern only the interest. In the first class of contracts, commercial obligations, the principal is generally returned, but for reasons which will presently be given, these contracts have less importance for our study.

The industrial world is obliged to adjust itself to these periodic returns to the creditor class of a part of the product of industry. This product is first converted into money and from the sum thus obtained the fixed payments are made. It is usually considered of the highest importance that the amount of the product thus devoted to fixed payments should vary as little as possible, since variations disturb calculations and interfere with business. Variations in the standard take the form of price fluctuations and these are either temporary or permanent movements. Prices may change from month to month and from quarter to quarter,

while still maintaining an average level. Or, again, these minor fluctuations may be compounded into larger movements over extended periods. The second class of price movements is the more important in its influence upon industry. This class might be called, in classic phrase, the movements in the normal value of the standard, while the temporary fluctuations might be considered as the changes in market value. Changes in the value of the standard affect industry by disturbing calculations and by disappointing expectations whose fulfillment is essential to the success of business operations. In so far, however, as these changes can be foreseen, their effects can be discounted, and the resulting injury can be reduced to a minimum. The possibility of thus anticipating price fluctuations varies inversely with the length of the period over which prediction must extend. Prediction for ninety days is a far different thing from prediction over three, five, or twenty years. Indeed, the last named periods are so extended that conditions which involve their entire duration are practically removed from the field of prevision. No one can tell what discoveries of sources of supply, what inventions of machines or processes, what new adjustment of productive forces may, within the next quarter century, completely revolutionize the industrial and commercial activity of the world. But, on the other hand, the wheat market, the iron market, or the dry goods trade are well within the prejudgment of the dealers, who may easily adjust themselves to changing conditions. We may conclude, therefore, that movements of normal value are far more important than variations of market value during short periods. At the same time, these temporary movements, though relatively less important, still have their influence, and must therefore be considered.

The value of gold is the level of prices. As prices change, the value of gold moves in the opposite direction.

The value of silver does not appear, save to a very limited extent, in its gold price. The value of silver must be ascertained from the movement of general prices, which, being also expressed in gold, can be employed to give an expression of the value of silver. For purposes of comparison, the value of gold must also be expressed in terms of commodities. These conversions may be obtained by the following formulæ:

(1) value of gold in terms of commodities equals

$$\frac{100}{\text{index number of commodities}}$$

(2) value of silver in terms of commodities equals

$$\frac{\text{index number of silver}}{\text{index number of commodities.}}$$

In explanation of the first formula, we may say that the values of gold and commodities stand in the reciprocal ratio to each other. When goods are compared with gold as a standard, gold is assumed to remain unchanged, and fluctuations in the price ratio are treated as if they were assignable to commodities alone. In the same way, assuming goods to be the constant, gold may be compared with goods as a standard by taking the reciprocal of the index number given in tables of prices.

With regard to silver, the prices of both silver and commodities are given in terms of gold; therefore, they may be compared one with the other. Since the movements of both are recorded relatively to a common measure, we can express their mutual relation by the ratios between their quoted numbers. The ratio of the index numbers of silver to the index numbers of goods will furnish a number indicating the movement of silver relatively to goods as a constant. Another method of obtaining the value of silver is to take the reciprocals of the index numbers of prices calculated on the silver standard.

In such an investigation it is well to make the field as wide as possible. We shall therefore compare the value movements of gold and silver calculated (1) from a comparison of prices in a gold standard country with silver prices in India, and (2) from a comparison of the Indian value of gold with the Indian value of silver. The tables of prices used in this study are those of Sauerbeck, comprising forty-five articles, the Economist, twenty-two articles, both in the London market; Soetbeer, 118 articles in the Hamburg market; French prices, compiled by the Permanent Commission of Valuations, thirty-eight articles;\* Falkner, in the Senate Report on Wholesale Wages and Prices, two hundred and twenty-three articles, United States' markets; and F. J. Atkinson, seventeen articles, in the India markets. On the basis of these prices, various series of index numbers, designed to show the movements of prices, have been constructed. The index numbers of Sauerbeck and Atkinson are made up on the basis of an average weighted according to the importance of each article in the production and trade of the country which is the seat of the investigation; that of the Senate Report on an average weighted according to consumption; and the index number of the Economist and those of Soetbeer and the French Commission on a simple average.

The two methods ordinarily employed to measure price fluctuations are: (1) To count from year to year, or from quarter to quarter, taking each quotation as a basis from which to measure to the next succeeding, and adding the differences thus obtained to find the sum of the variations; and (2) to measure from the first quotation of the period to the last, taking the difference as the total variation during the period. The first-mentioned method altogether ignores the

\* The prices of Soetbeer are based on the average value of the goods imported into the port of Hamburg. The total quantity and the total value of each article imported during the year being given, the first is divided into the second to find the average price. The French prices are fixed by a permanent commission which revises its figures at stated intervals on the basis of market conditions.

movements of normal value, and therefore the class of price fluctuations of most importance in the discussion in the standard question. The fluctuations on both sides of a given mean might cancel each other so that the price level might remain substantially unchanged, while the sum of the particular fluctuations might present an imposing total. For example, in each of the two series, 1, 2, 3, 4, 5, and 3, 1, 4, 2, 3, the sum of the fluctuations amounts to 8, and yet in the first case, the divergence of the last number from the first is 4, while in the second, it is zero. The second method, on the other hand, places undue emphasis on long periods, and prevents the influence of marked though temporary fluctuations from being seen. A more appropriate method is that of the mean average. An average is made of the index numbers included in the period which it is desired to examine. The sum of the deviations in the different numbers from this average is then taken, and divided by the number representing the average to obtain the percentage of total variation. The method of the total variation from the mean average combines in a way the two methods above described, although it may itself be open to the objection of giving undue importance to temporary movements. The second of these methods may be used to check the results obtained by the mean average.

We shall first compare the value movements of silver and gold in India; second, the value movement of silver in India with gold in London; and third, the value movements of the two metals in gold standard countries.

In the discussion which accompanies his statistical investigation of silver prices in India, Mr. Atkinson presents a table purporting to show the sum of the fluctuations in gold and silver.\* The fluctuations are computed by the method, above described, of counting from one extreme directly to another, and ignoring the intermediate fluctuations. The

\* Journal of the Royal Statistical Society, 1897, p. 93. "Silver Prices in India."

following table presents the materials for the calculation of price movements in India. The results of his computation are as follows. The sum of the variations in gold is 78, or 84.5 per cent; in silver, 89, or 73.9 per cent.

Fluctuations in Gold prices in London.		Per cent.	Fluctuations in Rupee prices in India.	Per cent.
Period.	Points.	no of = 100.	Points.	1" number of each = 100.
1871-1873 . . .	11	11.0	7	7.0
1873-1879 . . .	28	25.2	28	26.1
1879-1880 . . .	5	6.0	18	13.3
1880-1887 . . .	20	22.7	6	5.1
1887-1891 . . .	4	5.8	17	15.3
1891-1895 . . .	10	13.8	13	10.1
Total . .	78	84.5	89	73.9

Mr. Atkinson's own estimate does not include a calculation of the percentages of fluctuation, which is a necessary supplement, since a fluctuation of 5 from a base of 20, is twice as important as a fluctuation of 10 from a base of 80.

Mr. Atkinson remarks that the results of this comparison "appear to dispel the idea prevalent in some quarters of the suitability of silver as a measure of value in preference to gold, an idea due to the common impression regarding the imaginary stability of silver or rupee prices." Where the percentage of fluctuation is taken this conclusion appears to be unwarranted.

It is necessary, moreover, in order to get a comparison of value movements, to compare the reciprocals of the index numbers which, as we have already pointed out, give us an expression of the value movements of the two metals in terms of commodities.



*Values of Gold and Silver Compared in India, 1871-1873.*

Year.	I. Index No. of Rupee prices in India, Atkinson, 1871 =100.	II. Value of Silver in terms of commodities, reciprocal of Index No.	III. Index No. in relation to Gold, India.	IV. Value of Gold in terms of commodities, reciprocal of III.	V. Index No. of Gold prices in London, Sauerbeck.	VI. Value of Gold in terms of commodities, reciprocal of V.	VII. Index No. of Rupee prices, excluding rice.	VIII. Value of Silver in terms of commodities, reciprocal of VII.	IX. Index No. of Silver in London, Sauerbeck, 1867- 1877=100.	X. Value of Silver in terms of commodities, reciprocal of IX.
1871	100	100	99.7	100.3	100	100	100	100	99.7	99.7
1872	105	95.2	104.1	96	109	92.6	104	96.1	99.2	91.0
1873	107	93.4	104.2	95.9	111	90	103	97	97.4	87.7
1874	116	88.2	111.1	90	102	98	112	89.2	95.8	93.9
1875	103	97	96	104.1	96	104.1	103	97	93.3	97.1
1876	107	93.4	92.8	107.7	95	105.0	105	95.2	86.7	91.2
1877	138	72.4	124.5	80.3	94	106.3	135	74	90.2	95.9
1878	148	67.5	127.9	78.1	87	114.9	142	70.4	86.4	99.3
1879	135	74	113.7	97.9	83	120.4	130	76.9	84.2	101.4
1880	117	85.4	100.5	99.5	88	113.6	115	86.9	85.9	97.6
1881	106	94.3	90.1	110.9	85	117.6	106	94.3	85	100
1882	105	95.2	89.1	112.3	84	119	104	96.1	84.9	101
1883	106	94.3	88.1	113.5	82	121.9	104	96.1	83.1	101.3
1884	114	87.7	95	105.2	76	131.5	109	91.7	83.3	109.6
1885	113	88.4	90.3	110.1	72	138.8	108	92.5	79.9	110.9
1886	110	90.9	82.1	121.8	60	144.9	100	100	74.6	108.1
1887	111	90	81.4	122.8	68	147	109	92.6	73.3	107.7
1888	119	84	83.8	119.3	70	142.8	116	86.2	70.4	100.5
1889	125	80	87.8	113.8	72	138.8	100	100.0	70.2	97.5
1890	125	80	98	102	72	138.8	120	83.3	78.4	108.8
1891	128	78.1	104.2	106.1	72	138.8	123	81.3	74.1	102.9
1892	141	70.9	92.1	108.5	68	147	135	74	65.4	96.1
1893	138	72.4	88.6	112.8	68	147	132	75.7	58.6	86.1
1894	• • • •	• • • •	• • • •	• • • •	63	158.2	• • • •	• • • •	47.6	75.5
1895	• • • •	• • • •	• • • •	• • • •	62	161.2	• • • •	• • • •	47	75.8

There is no need of continuing the comparison beyond 1893, when the Indian mints were closed. Since that date, prices in India have not been controlled by the movement of silver. The results of this comparison are as follows: The sum of the fluctuations in the value of gold is 97 points, or 90.1 per cent; the sum of the fluctuations in silver is 59.6 points or 68.5 per cent.

Year.	Total fluctuations in value of Gold, London. Points	Per cent. First date of each period =100	Total fluctuations in value of Silver, India. Points	Per cent. First date of of period =100
1871-1873 . . .	10.0	10	6.6	6.6
1873-1879 . . .	30.4	33.7	19.4	20.7
1879-1880 . . .	6.8	5.6	11.4	15.4
1880-1887 . . .	33.4	29.4	4.6	5.4
1887-1891 . . .	8.2	5.5	11.9	13.2
1891-1893 . . .	8.2	5.9	5.7	7.2
	97.0	90.1	59.6	68.5

A comparison of the value movements of gold and silver, properly expressed in terms of commodities, shows that the advantage under Mr. Atkinson's own arrangement of periods is slightly with silver in respect to percentage of fluctuation. Another correction must be made in the computation. The comparison here made is between silver prices in India and gold prices in London, between the prices of seventeen articles and prices of forty-five articles, between an approximately perfect market open to all the compensating forces from a multitude of sources of supply, and at the centre of the world's demand, and a market much less developed. In India we find peculiar conditions. It is true that on the coast, and to an increasing extent in many regions of the interior where railroads or large water courses give ready access to central markets, we can assume at least an approach to conditions in England. But over the greater part of the country this cannot be said to be the case, and at the beginning of the period in question, when the railway system was in its infancy, the resemblance between the two markets was still more remote. India is split up into a number of separate provinces often with little intercommunication. The railways and the telegraph have brought only a fraction of the population into connection with the commercial centres. In 1880 there was one mile of railway for every 32,572 of population, and for every 141 square miles of territory; and in 1893 this had only increased

to one mile for 10,453 inhabitants, and 45 square miles of territory. The people of India are mainly agricultural. Rice and millet, on which they mainly rely as food, are largely dependent upon a rain-fall which varies widely from year to year, and from one district to another. Until recent years no attempt has been made on any large scale to meet these periodic deficiencies by importations from other countries. A failure of the customary food supply is not compensated as in occidental countries, by a recourse to other foods. The natives have frequently suffered great privations because they would not eat food to which they were not accustomed. Marked deficiencies of rain have occurred in 1864, 1868, 1876, 1885, and in 1892, 1893 and 1894. General droughts have been rare, but the lack of transportation facilities and the inertia of the people, which have just been noticed, have made it impossible to correct the effects of scarcity by movements from one district to another. In the case of rice, prices have frequently risen from 300 to 400 per cent above the normal. Thus at Madras, Salem division, the index number of rice was 121 in 1875, 280 in 1877, and 156 in 1880. In the southeast division of the province, the index number was 113 in 1873, and 250 in 1877. In Calcutta, the index number varied from 136 in 1883 to 200 in 1885, and was back at 111 in 1887. The sum of the index numbers for rice varied from 1,500 in 1871 to 2,062 in 1874, to 1,676 in 1876, to 2,693 in 1878, to 1,607 in 1887. If the comparison between the London and India prices is to be fair, the fluctuations of rice must evidently be eliminated. In the class of raw materials, difficulties of transportation have operated to disturb prices, and a perfect market cannot be said to exist, but the difficulties are not serious enough to greatly impair the value of the comparison. In the class of manufactured products, we have no difficulty, since they are in close touch with the world's markets. To set against these tendencies to fluctuation, we have, moreover, the natural inertia of the people of India, and the

small development of credit which exerts so great an influence upon prices in England. We should remember, however, that the calculations of Sauerbeck include thirty-three classes of articles, while those of Atkinson include only seventeen, and of these rice has been given a weight of nearly one-third. This would apparently tend to increase the influence of individual fluctuations upon the total index number in India as compared with London. Eliminating rice, the result of the comparison between London and India is as follows: The fluctuations in gold amount to 97 points, or 90.1 per cent; in silver, to 53.9 points, or 59.8 per cent.

Year.	Total fluctuations in value of Gold, London, Points	Per cent. First date of each period = 100	Total fluctuations in value of Silver, India, Points.	Per cent. First date of each period = 100
1871-1873 . . .	10.0	10.0	3.0	3.0
1873-1879 . . .	30.4	33.7	20.1	20.7
1879-1880 . . .	6.8	5.6	10.0	13.0
1880-1887 . . .	33.4	29.4	4.8	5.5
1887-1891 . . .	8.2	5.5	10.4	10.8
1891-1893 . . .	8.2	5.9	5.6	6.8
	97.0	90.1	53.9	59.8

The result is considerably more favorable to the relative stability of Indian prices than before this necessary elimination. The percentage of fluctuation is 18.7 less than in the calculation next preceding.

One more correction must be made in this comparison before it will be accurate. It is possible to obtain the value of gold in India by allowing for the fluctuations in the relative values of gold and silver. Silver has a certain value in terms of commodities, and also a gold value. By dividing the numbers which represent the value of gold in terms of silver by the numbers which represent the value of commodities in terms of silver, we obtain a series which represents the value of gold in terms of commodities. This formula was employed to obtain an expression of the value

of silver in terms of commodities. Mr. Atkinson has made this computation and evidently regards it of some importance, for he says: "This column is a necessity in order to bring rupee prices into line with gold prices for purposes of comparison. In estimating the "imaginary stability" of silver prices Mr. Atkinson has forgotten this "necessity," and, as we have seen, he has made his comparison between London and India. The comparison between the values of gold and silver in India is as follows: The fluctuations in the value of silver by the method of extreme differences is 89 points, or 76.9 per cent; of gold, 51 points, or 50.2 per cent.

Period.	Total fluctuation in value of Silver, India. Points.	Per cent. First date of each period = 100	Total fluctuations in value of Gold, India. Points.	Per cent. First date of each period = 100
1871-1873 . . .	7	7.0	4.4	4.2
1873-1879 . . .	28	26.1	8.0	8.3
1879-1880 . . .	18	13.3	11.6	13.1
1880-1887 . . .	6	5.1	4.7	3.9
1887-1891 . . .	17	15.3	16.6	13.4
1881-1893 . . .	13	10.1	5.7	7.3
	89	76.9	51.0	50.2

This method would have enforced Mr. Atkinson's conclusion as to the relative stability of the value of gold, for the advantage is decidedly with gold, and we may assume that in India, measured by the method of extreme differences, gold has been more stable than silver.

We have now to apply the method of the mean average to the value movements of gold and silver in India. The periods that have been thus far employed will serve as well as any, since they correspond approximately with the general movement of business in Europe and America. India must also have been affected, though certainly to a less extent, by these periods of expansion and depression. The sum of the points of the mean variations of the value

of silver is 147.7, or 175.5 per cent, and of gold, 181.9 points, or 176.1 per cent.

Period.	Total variations of value of Silver from mean averages.	Per cent. Mean average of each period = 100.	Mean averages.	Total variations of value of Gold from mean averages.	Per cent. Mean average of each period = 100.	Mean averages.
1871-1873 . .	7.8	8.1	96.2	5.8	5.9	97.4
1873-1879 . .	71.4	85.7	84.5	64.8	69.3	93.4
1879-1880 . .	22.2	26.2	83.3	32.8	31.8	101.8
1880-1887 . .	19.3	21.0	91.5	36.2	31.5	114.8
1887-1891 . .	18.3	22.2	82.4	34.9	30.9	112.8
1891-1893 . .	8.7	11.9	73.8	7.4	6.7	109.1
Totals . .	147.7	175.1	. . . .	181.9	176.1	. . . .

Here the metals are nearly equal over the entire period, but it will be observed that the percentage of fluctuation from 1879 to 1891 is far greater in the case of gold than in the case of silver. During the first years of the period, gold had a considerable advantage. Taking the mean average from the entire period from 1871 to 1893 as the basis of comparison, we find that in the case of gold the fluctuations amounted to 225.6 on a base of 104.3, while in the case of silver the sum of the fluctuations was 194.9, calculated on a base of 85.7; or 216.2 per cent in the case of gold, and 227.4 for silver. Again the advantage is with gold.

We have already employed the method of extreme differences to compare the movement of silver in India with the movement of gold in London. The method of variation from the mean may now be employed to supplement the results thus obtained. It was found that the total index number for India, compared with Sauerbeck's index number, gave a total percentage of fluctuation for silver of 78.5 and for gold of 80.1; and, also, that when the comparison was made more comparable by the elimination of rice, the

percentage of fluctuation in silver was 53.9. In applying the second method to obtain the comparison between London and India, this elimination must be continued. The results of the comparison are as follows: The sum of the mean variations in silver is 141.9, or 163.6 per cent; of gold, 153.3, or 123.7 per cent.

Period.	Total variations from the mean in silver in India. Points.	Per cent mean average of each period =100.	Mean averages.	Total variations from the mean in gold in London.	Mean averages.	Per cent mean average of each period =100.
1871-1873 . . .	4.6	4.7	97.7	9.6	94.2	9.0
1873-1879 . . .	71.5	83.5	85.6	32.3	103.0	31.3
1879-1880 . . .	10.0	12.2	81.9	6.8	117.0	5.8
1880-1887 . . .	16.6	17.6	94.6	72.9	131.5	55.4
1887-1891 . . .	30.6	34.5	88.6	19.7	141.2	13.9
1891-1893 . . .	8.6	11.1	77.0	12.0	145.2	8.3
Total . . . .	141.9	163.6	. . .	153.3	. . .	123.7

Gold by this computation has a slight advantage over silver in respect to percentage of fluctuation. When a comparison is made between the different periods, however, the advantage of gold largely disappears. After the first two periods, the percentage of variation from one period to another is far less for silver than for gold. Taking the total fluctuations from the mean for the entire period, we find that gold fluctuated 324.0 per cent from a mean of 122.5, while silver fluctuated 232.1 per cent from a mean of 75.7. The superiority of silver over gold over long periods is still more strikingly shown by comparing successive years as bases with 1893, the last year which is taken.

Year.	Sauerbeck's index numbers for commodities in terms of gold.		Index numbers for gold in terms of commodities reciprocal of index number.	Sauerbeck's index numbers for silver.		Index numbers for silver in terms of commodities reciprocal of index number.
	100=average 1867-1877.	100=average 1846-1850.		15% to 1 old ratio.	100 being average of 1846-1850.	
1846	89	107.7	92.8	97.5	99.4	92.2
1847	95	115.0	86.9	98.1	99.9	86.8
1848	78	94.4	105.9	97.8	99.7	105.6
1849	74	89.5	111.7	98.2	100.2	111.9
1850	77	93.2	107.2	98.7	100.7	108.0
1851	75	90.7	110.2	99.9	101.9	112.3
1852	78	94.4	105.9	99.9	101.9	107.7
1853	95	115.0	86.9	101.2	103.2	89.7
1854	102	123.4	81.0	101.1	103.1	87.6
1855	101	122.2	81.8	100.7	102.7	84.0
1856	101	122.2	81.8	101.0	103.0	84.2
1857	105	127.1	86.5	101.5	103.5	81.4
1858	91	110.1	90.8	101.0	103.0	93.5
1859	94	113.8	87.8	102.0	104.0	91.3
1860	99	119.8	83.4	101.4	103.4	86.1
1861	98	118.6	84.3	99.9	101.9	85.9
1862	101	122.3	81.7	100.9	102.9	84.1
1863	103	124.6	80.2	101.1	103.1	82.7
1864	105	127.1	78.6	100.9	102.9	84.1
1865	101	122.2	81.8	101.3	102.3	83.3
1866	102	123.4	81.0	100.5	102.5	83.0
1867	100	121.0	82.6	99.7	101.7	84.0
1868	99	119.8	83.4	99.6	101.6	84.6
1869	98	118.6	84.3	99.6	101.6	85.6
1870	96	116.2	86.0	99.6	101.6	87.5
1871	100	121.0	82.6	99.7	101.7	84.0
1872	109	131.9	75.8	99.2	101.2	76.7
1873	111	134.3	74.4	97.4	99.3	73.9
1874	102	123.4	81.0	95.8	97.7	79.1
1875	96	116.2	86.0	93.3	95.2	81.9
1876	95	115.0	86.9	86.7	88.4	76.8
1877	94	113.8	87.8	90.2	92.0	80.8
1878	81	105.3	94.1	86.4	88.1	83.6
1879	83	100.4	90.6	84.2	85.9	85.5
1880	88	106.5	93.8	85.9	87.8	82.4
1881	85	102.4	97.1	85.0	86.7	84.2
1882	84	101.6	98.4	84.9	86.6	85.2
1883	82	99.2	100.8	83.1	84.6	85.2
1884	76	92.0	108.6	83.3	85.0	89.0
1885	72	87.1	114.8	79.9	81.5	93.5
1886	64	78.4	127.5	74.6	76.1	97.1



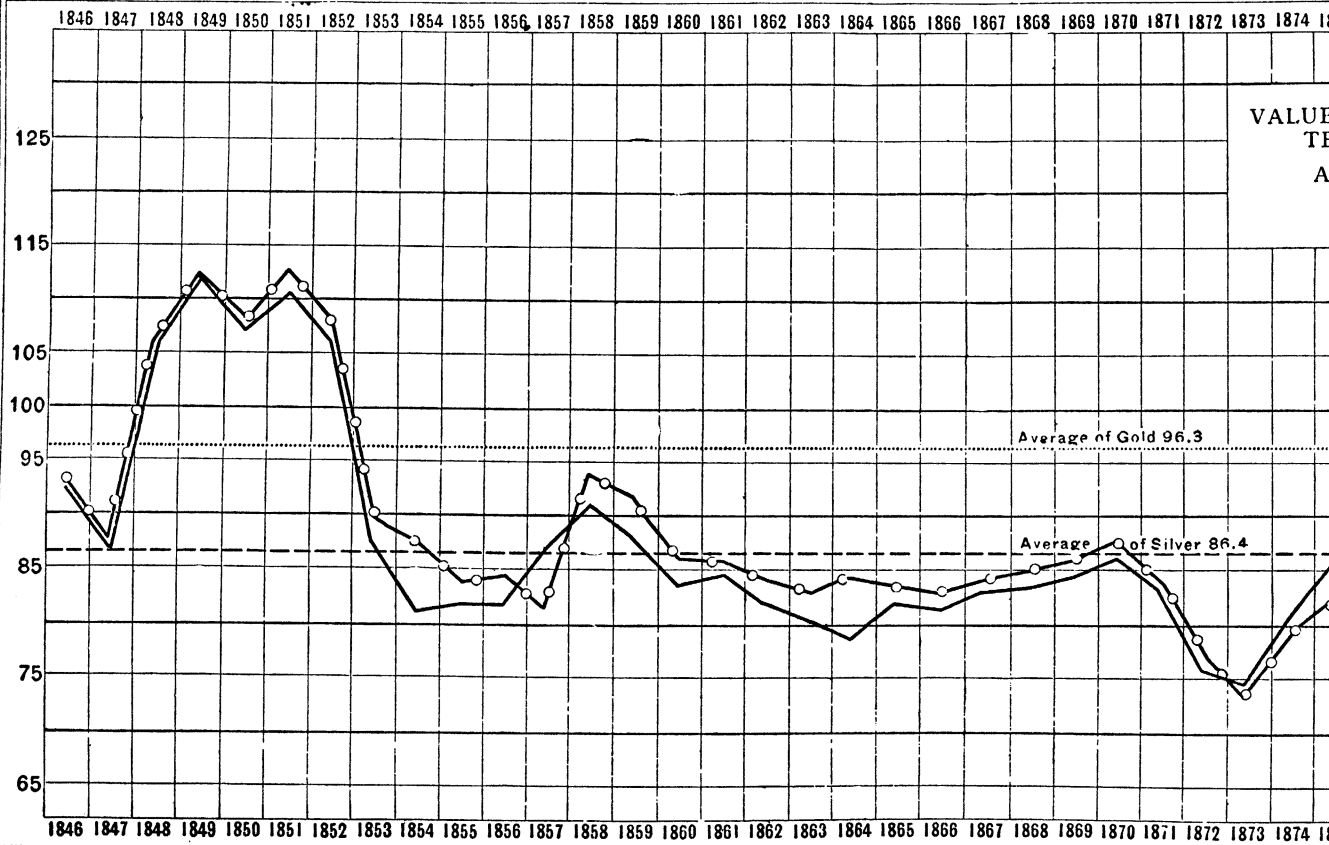
Year.	Sauerbeck's index numbers for commodities in terms of gold.		Index numbers for gold in terms of commodities reciprocal of index number.	Sauerbeck's index numbers for silver.		Index numbers for silver in terms of commodities reciprocal of index number.
	100=average 1867-1877.	100=average 1846-1850.		15% to 1 old ratio.	100 being average of 1846-1850.	
1887	68	82.3	121.5	73.3	74.7	90.7
1888	70	84.7	118.0	70.4	71.8	84.7
1889	72	87.1	114.8	70.2	71.6	82.2
1890	72	87.1	114.8	78.4	80.0	91.8
1891	72	87.1	114.8	74.1	75.6	89.8
1892	68	82.3	121.5	65.4	66.7	81.0
1893	68	82.3	121.5	58.6	59.7	72.5
1894	63	76.2	131.2	47.6	48.5	63.6
1895	62	75.0	133.3	47.0	47.9	63.8

From 1871 to 1893, gold varied 47 per cent and silver 24.3 per cent; from 1873 to 1893, gold varied 63.3 per cent and silver 21.9 per cent; from 1876 to 1893, gold varied 40 per cent and silver 20.4 per cent; from 1879 to 1893, gold varied 22 per cent and silver 1.5 per cent; from 1882 to 1893, gold varied 23.4 per cent and silver 21.2 per cent; from 1885 to 1893, gold varied, however, only 5.9 per cent, while silver varied 12.1 per cent. On the whole, silver was much more stable over extended periods than gold, and this conclusion will also hold good as to the stability of the value of silver in India compared with the value of gold in London.

We come now to the more important part of our study, the comparison between the value movements of gold and silver in gold standard countries. We may profitably extend the comparison over a much longer period in order to include the influence of the French mint before 1873, and of the United States and India since 1893, upon the relative values of the metals. We shall examine the period from 1846 to 1895, using Sauerbeck's tables as

material for the calculations. For greater clearness the index numbers have been represented upon the accompanying chart. It is at once apparent, without burdening the discussion with unnecessary figures, that silver and gold, from 1846 to 1873, preserved a very remarkable correspondence in their relative values. The effect of the great gold discoveries of the early years of the period appears in a fall in the value of gold, reaching its extreme in 1854; but in its fall it dragged down silver with it. The fall in gold was, however, as might be expected, more severe, and the result was that from 1854 to 1873 silver remained closer to the base line of commodities than did gold. But the divergence was slight, and, in general, the two metals moved together. Beginning with 1873, we have an increasing divergence between the two. A more detailed examination reveals the following facts relative to the stability of the two metals over long periods. From 1846 to 1895, gold has increased its purchasing power 42.5 per cent, while the purchasing power of silver is less by 51.9 per cent. From 1846 to 1891, when the great fall in the value of silver began, the purchasing power of gold increased 23.7 per cent, while that of silver decreased 2.7 per cent. From 1873 to 1891, gold increased its power over commodities 54.3 per cent, and silver also rose in value 21.5 per cent. Taking the period 1873 to 1895, gold rose 79.1 per cent, while silver fell 13.7 per cent. Over the entire period of fifty years, gold, more nearly than silver, possessed the same purchasing power in 1895 which it had in 1846. Since 1873, the advantage is with silver.

This table makes it possible to test the accuracy of the contention that the double standard is more stable than the single standard. We may compare the period 1851-1873 with the period 1873-1895. During the first period the world was divided into gold standard, silver standard, and bimetallic countries. Although actual bimetallism on any considerable scale did not exist outside of France, the



1866 1867 1868 1869 1870 1871 1872 1873 1874 1875 1876 1877 1878 1879 1880 1881 1882 1883 1884 1885 1886 1887 1888 1889 1890 1891 1892 1893 1894 1895

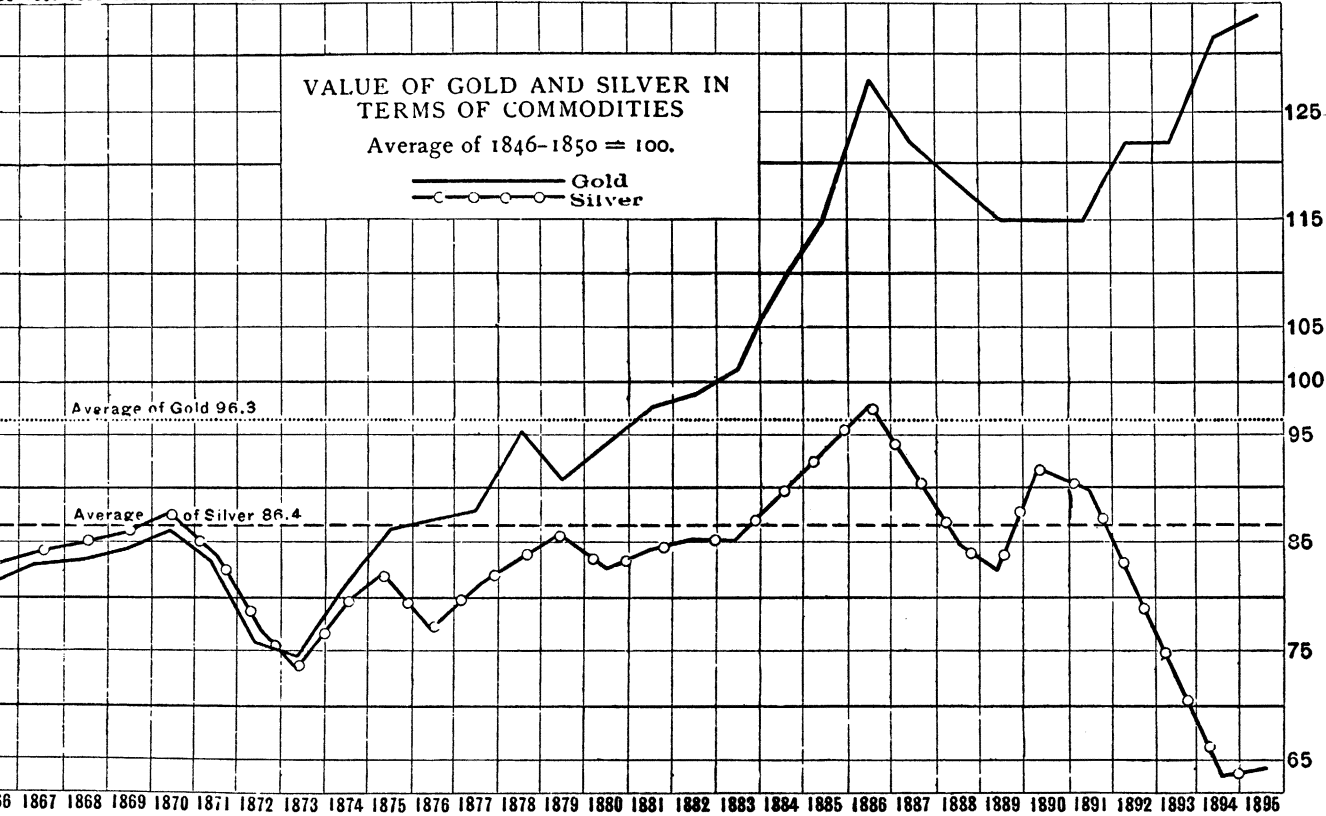
# VALUE OF GOLD AND SILVER IN TERMS OF COMMODITIES

Average of 1846-1850 = 100.

— Gold  
—○— Silver

Average of Gold 96.3

Average of Silver 86.4



conditions were favorable to an equalization of the demand for the precious metals according to the bimetallic hypothesis, and, as we have seen, gold and silver did, in fact, maintain a close correspondence throughout the period. Before 1873, the value of gold varied with the value of silver. In order to compare the joint standard with the gold standard we have, therefore, only to compare the movements of the value of gold during the two periods. Since 1873, we have had a movement toward the single gold standard and it is now quite generally recognized in legislation as the "money of civilization." In other respects the two periods are comparable. If any advantage exists in respect to influences working toward stability of prices, that advantage belongs to the years since 1873.

Beginning with 1848, came a series of revolutionary changes in industry. The new gold exercised a profound influence on prices; and the numerous wars of the period are responsible for frequent perturbations of supply and demand. These years were also remarkable for severe panics, and for enormous emissions of paper money by several European nations and by the United States. Since 1873, numerous changes in transportation and production have disturbed industry, and some severe crises have disturbed prices, but it is probable that outside the influence of the standard, the second period has tended to greater stability of prices than the years preceding. The influence of the standard we now propose to examine by the methods previously employed. A division of five years' periods has been employed. From 1851 to 1873, measured by the method of extreme differences, the value of the standard fluctuated 55.4 points, or 58.3 per cent; from 1873 to 1895, 53.7 points, or 55.7 per cent. By the method of the mean average, the sum of the fluctuations in the first period is 84.3 points, or 95.9 per cent; in the second period (1873 to 1895), 100.2 points or, 95.1 per cent. On the whole the two periods are equal. If any advantage exists, it belongs to the first period.

The difference is too slight, however, to warrant any conclusions as to the superiority of one standard over the other.

PERIOD.	SUM OF EXTREME DIFFERENCES.		TOTAL VARIATIONS FROM THE MEAN.	
	Points.	Per cent. first date of each period=100.	Points.	Per cent. mean aver- age of each period=100.
1851-1853 . . .	23.3	21.1	28.2	27.9
1854-1858 . . .	9.8	12.0	17.0	20.1
1859-1863 . . .	7.6	8.6	10.2	12.2
1864-1868 . . .	4.8	6.1	6.8	8.3
1868-1873 . . .	9.9	10.5	22.1	27.4
Totals 1851-1873	55.4	58.3	84.3	95.9
1873-1877 . . .	13.4	18.0	22.1	26.5
1878-1882 . . .	4.3	4.5	11.8	12.4
1883-1887 . . .	20.7	20.5	39.8	34.7
1888-1892 . . .	3.5	2.9	11.8	10.1
1892-1895 . . .	11.8	9.8	14.7	11.4
Totals 1873-1895	53.7	55.7	100.2	95.1

We may now pass from these general considerations to an examination of particular periods. Taking first the method of extreme differences for the period 1871-1895, according to the division already laid down, the results are as follows: By the method of extreme differences, the fluctuations in the value of gold amount to 77.2 points, or 81.7 per cent; the fluctuations in silver amount to 59.2 points, or 72.1 per cent.

Period.	Sum of ex- treme fluctua- tions in value of Gold. Points.	Per cent. First date of each period = 100.	Sum of ex- treme fluctua- tions in value of Silver. Points.	Per cent. First date of each period. = 100.
1871-1873 . . .	8.2	9.9	10.1	12.0
1873-1879 . . .	16.2	21.7	12.6	17.0
1879-1880 . . .	3.2	3.5	3.1	3.6
1881-1887 . . .	24.4	25.0	6.5	7.7
1887-1891 . . .	6.7	5.5	9.7	10.6
1891-1895 . . .	18.5	16.1	17.2	21.2
Totals . . .	77.2	81.7	59.2	72.1

## THE RELATIVE STABILITY OF GOLD AND SILVER. 57

The significance of these figures is unmistakable. They indicate that, during the entire period, by the method of extreme differences, silver is far more stable than gold. If we take the period 1871 to 1891, thus avoiding the fluctuations after the second date, but including the great rise in silver in 1889 to 1890, the difference in favor of silver is still more striking. Up to 1891, in the five periods included between that date and 1873, the sum of the fluctuations in gold was 58.7 points, or 65.6 per cent, while the sum of the fluctuations in silver was 42 points, or 50.9 per cent.

By the method of the variation from the mean these results are confirmed. The sum of the fluctuations in gold is

Period.	Variations from the mean in value of Gold. Points.	Per cent. mean aver- age of each period = 100.	Variations from the mean in value of Silver. Points.	Per Cent. Mean aver- age of each period = 100.
1871-1873 . . . . .	10.0	12.8	11.6	15.2
1873-1879 . . . . .	32.6	37.9	21.8	27.1
1879-1880 . . . . .	3.2	3.4	3.1	3.5
1880-1887 . . . . .	68.4	62.4	26.9	30.1
1887-1891 . . . . .	31.1	10.1	17.6	20.0
1891-1895 . . . . .	11.8	25.0	35.0	47.2
Totals . . . . .	156.9	151.6	116.0	143.1

156.9 points, or 151.6 per cent; in silver, 116.0 points, or 143.1 per cent. The advantage is very decidedly with silver, and if, as above, we omit the sixth period, the percentage of fluctuation is reduced to 95.9, while gold stands at 126.6. If we take the mean average for the entire period, 1871-1895, as the basis for comparison, the sum of the fluctuations in gold is 396.6 from a mean average of 103.6, while the sum of the fluctuations in silver is only 146.5 from a mean average of 82.3. As before, we shall compare the fluctuations from successive years to the year 1895.

From 1871 to 1895, gold varied 51.7 per cent and silver 20.2 per cent; from 1873 to 1895, gold varied 58.9 per cent and silver 10.1 per cent; from 1876 to 1895, gold varied 46.4 per cent and silver 18.1 per cent; from 1879 to 1895, gold varied 42.7 per cent and silver 21.7 per cent; from 1882 to 1895, gold varied 34.9 per cent and silver 21.4 per cent; from 1885 to 1895, gold varied 18.5 per cent and silver 29.7 per cent; from 1888 to 1895, gold varied 15.3 per cent and silver 20.9 per cent, and from 1891 to 1895, gold varied 18.5 per cent and silver 26.0 per cent. Before 1885, the advantage was decidedly with silver. Since that time, gold fluctuates less than silver, although the difference between the two metals is not so pronounced as during the earlier years. On the basis of Sauerbeck's figures, silver is more stable in value than gold.

The same method may now be applied to the tables of the Economist, Falkner, the French Valuation Committee and Soetbeer. The results for gold and silver together are presented on pages 59, 60 and 61.

These figures merely confirm the results previously attained. The advantage of silver is most pronounced up to 1891. After that date its superiority over gold diminishes. The sum of the variations from the mean over the entire period give the following results:

		Points.	Per Cent.	Base.
Economist . . . . .	Gold . .	309.7	289.2	107.0
	Silver . .	122.6	141.8	86.4
Falkner . . . . .	Gold . .	139.3	141.1	98.7
	Silver . .	134.3	165.8	81
French Valuation Committee . . . . .	Gold . .	183.3	143.5	127.9
	Silver . .	131.5	127.0	103.5
Soetbeer . . . . .	Gold . .	158.4	153.1	103.4
	Silver . .	38	45.2	84



*Comparison of the Commodity Values of Gold and Silver, 1860-1891.*

YEAR.	ECONOMIST.			FALKNER.			FRENCH VALUATION COMMITTEE.			SOETBEER.			SILVER.	
	Gold value of com- modities.	Commodity value of gold.	Commodity value of silver.	Gold value of com- modities.	Commodity value of gold.	Commodity value of silver.	Gold value of com- modities.	Commodity value of gold.	Commodity value of silver.	Gold value of com- modities.	Commodity value of gold.	Commodity value of silver.	Gold value of sil- ver.	Year.
1873.	122	81.9	78.6	122.0	81.9	78.1	102.5	97.5	93.6	114.3	87.4	83.9	96.0	1873
1874.	119.4	83.7	79.1	119.4	83.7	79.1	94.0	106.3	100.5	112.6	88.8	83.9	94.5	1874
1875.	113.4	88.1	81.2	113.4	88.1	81.2	87.4	114.4	105.3	107.3	93.1	85.8	92.1	1875
1876.	104.8	95.4	81.5	104.8	95.4	81.5	84.7	118.0	100.9	106.1	94.2	80.5	85.5	1876
1877.	104.4	95.7	85.0	104.4	95.7	85.0	82.0	121.9	108.2	105.6	94.6	84.0	88.8	1877
1878.	99.9	100.1	87.2	99.9	100.1	85.2	78.4	127.5	108.6	99.7	100.3	85.4	85.2	1878
1879.	96.6	103.3	85.9	96.6	103.5	85.9	76.4	130.8	108.6	96.8	103.3	85.7	83.0	1879
1880.	106.9	93.5	79.2	106.9	93.5	79.2	79.2	126.2	106.9	100.8	99.2	84.0	84.7	1880
1881.	105.7	94.6	79.1	105.7	94.6	79.1	76.0	131.5	110.1	100.1	99.9	83.6	83.7	1881
1882.	108.5	92.1	77.0	108.5	92.1	77.0	73.4	136.2	113.8	101.0	99	82.7	83.6	1882
1883.	106.0	94.3	77.2	106.0	94.3	77.2	73.5	136.0	111.4	101.0	99	81.0	81.9	1883
1884.	82.5	121.2	99.3	99.4	100.6	99.3	72.4	138.1	113.2	94.4	105.9	86.8	82.0	1884
1885.	79.3	126.1	99.3	93.0	107.5	99.3	69.7	143.4	113.0	89.9	111.2	87.6	73.8	1885
1886.	73.3	136.4	100.2	91.9	108.8	100.2	69.3	144.3	106.2	86.0	116.2	88.0	73.5	1886
1887.	75.3	132.8	96.0	92.6	107.9	96.0	70.7	141.4	102.2	84.3	118.6	85.7	72.3	1887
1888.	80.0	125.0	86.8	94.2	106.1	86.8	73.5	136.0	94.5	84.3	118.6	82.4	69.5	1888
1889.	79.6	125.6	86.6	94.2	106.1	86.6	80.5	124.2	85.7	87.7	114.0	78.6	69.0	1889
1890.	82.3	121.5	93.9	92.3	108.3	93.9	83.2	120.1	92.9	89.4	111.8	86.4	77.3	1890
1891.	81.0	123.4	90.1	92.2	108.4	90.1	79.2	126.2	92.1	90.3	110.7	80.8	73.0	1891

*Comparison Between the Sum of the Variations in the Values  
Extreme Differences from Four Series of*

PERIOD.	ECONOMIST.						FALKNER.					
	Gold.			Silver.			Gold.			Silver.		
	Points.	Per cent.	Base.	Points.	Per cent.	Base.	Points.	Per cent.	Base.	Points.	Per cent.	Base.
1873-1879	21.6	26.3	81.9	7.3	9.2	78.6	21.6	26.3	81.9	7.8	9.9	78.1
1879-1880	10.0	9.6	103.5	6.7	7.8	85.9	10.0	9.6	103.5	6.7	7.7	85.9
1881-1887	16.9	21.3	79.1	16.9	21.3	79.1	13.3	14.0	94.6	16.9	21.3	79.1
1887-1891	9.4	7.0	132.8	5.9	6.1	96	.5	.4	107.9	5.9	6.1	96.0
Totals.	57.5	64.2	. . .	36.8	44.4	. . .	45.4	50.3	. . .	37.3	45.0	. .

*Calculated According to the Method*

1873-1879	46.8	49.7	94.0	20.3	24.5	82.6	50.4	54.4	92.6	16.7	20.3	82.2
1879-1880	9.8	9.8	98.4	6.7	8.1	82.5	10.0	10.1	98.5	6.7	.8	82.5
1881-1887	91.6	80.4	113.9	71.8	80.0	89.7	43.4	43.0	100.8	71.8	80.0	89.7
1887-1891	14.1	11.4	125.6	17.0	18.7	90.6	5.1	4.7	107.3	20.9	23.0	90.7
Totals.	162.3	239.9	. . .	115.8	131.3	. . .	68.9	112.2	. . .	116.1	124.1	. .

*The Totals may be*

	ECONOMIST.			
	Gold.		Silver.	
	Points.	Per cent.	Points.	Per cent.
Sum of extreme differences . . . . .	57.5	64.2	36.8	44.4
Sum of mean variations . . . . .	162.3	239.9	115.8	131.3

# THE RELATIVE STABILITY OF GOLD AND SILVER. 61

*of Gold and Silver Calculated According to the Method of Index Numbers of Extreme, 1873-1895.*

FRENCH VALUATION COMMITTEE.						SOETBEER.					
Gold.			Silver.			Gold.			Silver.		
Points.	Per cent.	Base.	Points.	Per cent.	Base.	Points.	Per cent.	Base.	Points.	Per cent.	Base.
32.3	33.1	97.5	15.0	16.0	93.6	15.9	15.3	87.4	1.8	2.1	83.9
4.6	3.5	130.8	1.7	1.5	108.6	4.1	3.9	103.3	1.7	1.9	85.7
9.9	7.5	131.5	7.9	7.1	110.1	18.7	18.7	99.8	2.1	2.5	83.6
15.2	10.7	141.4	10.1	9.8	102.2	7.9	6.6	118.6	4.9	5.7	85.7
62.0	54.0	. . . .	34.7	34.9	. . .	46.6	44.5	. . .	10.5	10.5	. . .

*of Variation from the Mean.*

53.4	45.7	116.6	30.4	29.3	103.6	29.2	30.8	94.5	8.7	10.3	84.1
4.6	3.5	128.5	1.7	1.5	107.7	4.1	4.1	101.2	1.7	2.0	84.8
26.0	18.7	138.7	42.5	38.8	109.5	49.3	46.0	107.1	15.8	18.5	85.0
36.5	28.1	129.5	19.4	20.7	93.4	15.4	13.4	114.7	13.0	15.7	82.7
120.5	96.0	. . . .	94.0	92.0	. . .	98.0	94.3	. . .	39.2	46.5	. . .

*Presented as Follows :*

FALKNER.				FRENCH VALUATION COMMITTEE.				SOETBEER.			
Gold		Silver.		Gold.		Silver.		Gold.		Silver.	
Points.	Per cent.	Points.	Per cent.	Points.	Per cent.	Points.	Per cent.	Points.	Per cent.	Points.	Per cent.
45.4	50.3	37.3	45.0	62.0	54.0	34.7	34.9	46.6	44.5	10.5	10.5
68.9	112.2	116.1	124.1	120.5	96.0	94.0	92.0	98.0	94.3	39.2	46.5

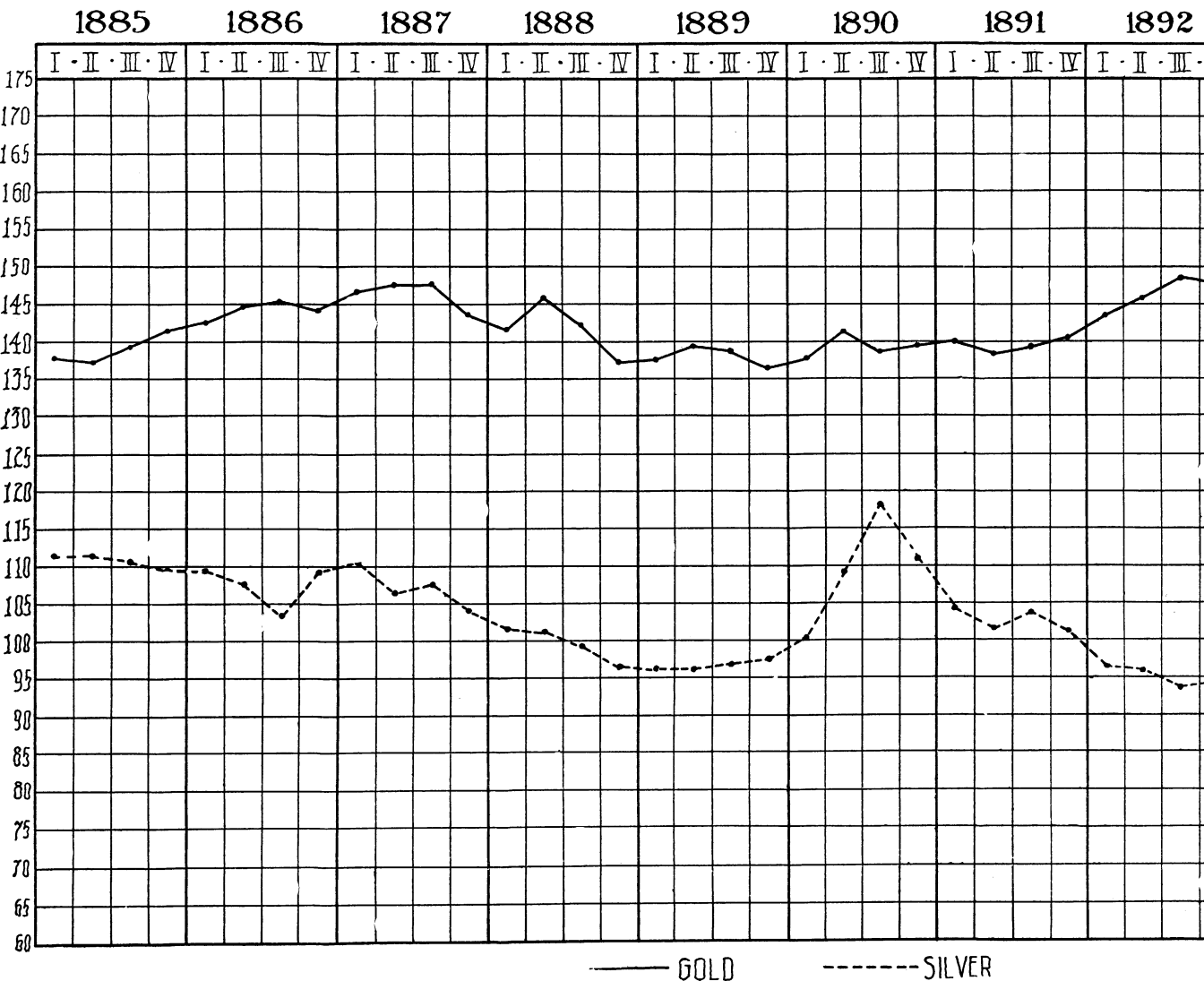
The advantage of silver over the entire period is at once evident. In only one series of index numbers, that of Dr. Falkner, is gold superior, and there its advantage over silver is only 11.9 per cent, while in the Economist tables silver has an advantage over gold of 108.6 per cent, in the French tables of 4 per cent, and in Soetbeer's of 47.8 per cent. We may also compare successive periods, as in the case of Sauerbeck's tables, taking the extreme differences:

	ECONOMIST.		FALKNER.		FRENCH VALUATION COMMITTEE.		SOETBEER.	
	Gold.	Silver.	Gold.	Silver.	Gold.	Silver.	Gold.	Silver.
1873-1891	41.5	11.5	26.5	12.0	28.7	1.5	23.3	3.1
	50.6	14.6	32.3	15.3	29.4	1.6	26.6	3.6
1876-1891	28	8.6	13.0	8.6	8.2	8.8	16.5	.3
	29.4	15.5	13.6	10.5	6.9	8.7	17.5	.3
1879-1891	20.1	4.2	4.9	4.2	4.6	16.5	7.4	4.9
	19.3	4.8	4.7	4.9	3.5	15.1	7.1	5.7
1882-1891	31.3	13.1	16.3	13.1	10.0	21.7	11.7	1.9
	33.9	17.0	17.5	10.7	7.9	19.0	11.9	2.2
1885-1891	2.7	9.2	.9	9.2	17.2	20.9	.5	6.8
	2.1	9.2	.5	9.2	11.9	18.4	.4	7.7
1889-1891	2.2	4.5	2.3	3.5	2.0	6.4	3.3	2.2
	1.7	5.1	2.1	4.0	1.6	7.4	2.8	2.7
Totals.								
Points	125.8	51.1	63.6	50.6	70.7	72.7	62.7	19.2
Per cent.	137.0	65.6	70.7	55.1	61.2	70.2	66.3	22.2

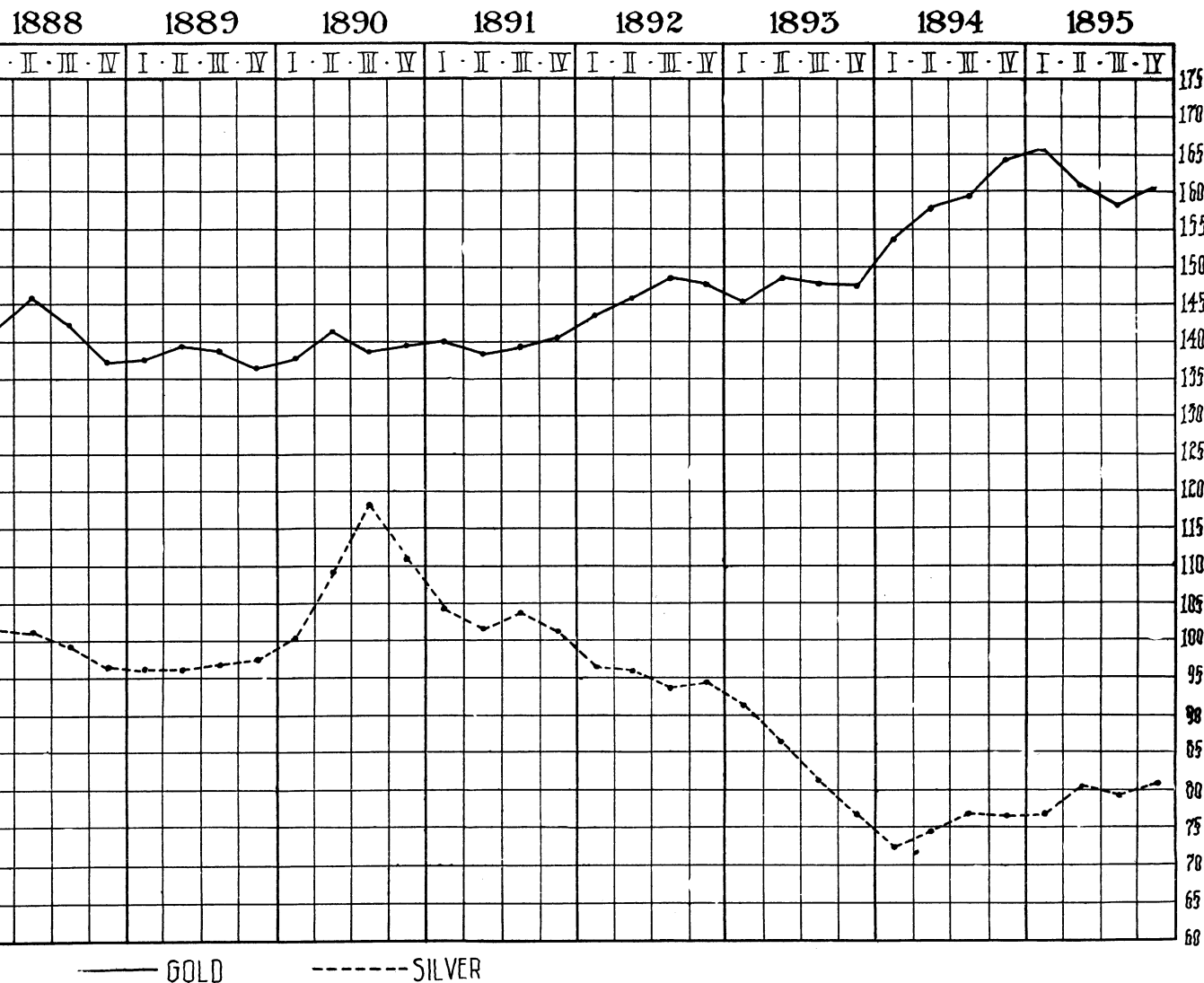
The sum of the variations is very largely in favor of silver. It is to be remarked, however, that during the following periods gold had an advantage over silver: Economist, V, VI; Falkner, III, V and VI; French Valuation Committee, II, III and IV; Soetbeer, V. The advantage of gold is in most cases very slight. In all the tables the gain of silver is greatest over the entire period 1873-1891.

We may now conclude our examination of the relative stability of gold and silver over extended periods and examine their movements over shorter periods. For this purpose the quarterly index numbers of Sauerbeck will serve. They extend back to 1885. A period of eleven years will be taken:

# COMMODITY VALUES OF SILVER AND GOLD BY QUARTERS 188



# OF SILVER AND GOLD BY QUARTERS 1885-1895



# THE RELATIVE STABILITY OF GOLD AND SILVER. 63

YEARS. QUARTERS.	Gold value of commodities.	Commodity value of gold.	Gold value of silver.	Commodity value of silver.	YEAR.	Gold value of commodities.	Commodity value of gold.	Gold value of silver.	Commodity value of silver.	YEAR.	Gold value of commodities.	Commodity value of gold.	Gold value of silver.	Commodity value of silver.
1885 I II III IV	72.5	137.9	80.7	111.3	I	72.7	137.5	70.0	96.2	1893 I II III IV	68.9	145.1	63.0	91.4
	72.8	137.3	81.1	111.4	II	71.7	139.4	69.0	96.2		67.4	148.3	58.3	86.4
	71.8	139.2	79.6	110.8	III	72.0	138.8	69.8	96.9		67.7	147.7	55.1	81.3
	70.8	141.2	77.9	109.7	IV	73.2	136.6	71.4	97.5		67.8	147.4	52.2	76.9
1886 I II III IV	70.2	142.4	77.0	109.6	I	72.5	137.9	72.6	100.1	1894 I II III IV	65.0	153.8	47.3	72.7
	69.0	144.9	74.5	107.9	II	70.8	141.2	77.2	109.0		63.3	157.9	47.2	74.5
	68.9	145.1	71.2	103.3	III	72.1	138.6	85.1	118.0		62.8	159.2	48.4	77.0
	69.4	144.0	75.8	109.2	IV	71.7	139.4	79.6	111.0		60.9	161.2	46.6	76.5
1887 I II III IV	68.2	146.6	75.3	110.4	I	71.4	140.0	74.4	104.2	1895 I II III IV	60.3	165.8	46.4	76.9
	67.8	147.4	72.2	106.4	II	72.3	138.3	73.6	101.7		62.2	160.7	50.0	80.3
	67.8	147.4	73.1	107.8	III	71.7	139.4	74.5	103.9		63.2	158.2	50.0	79.1
	69.7	143.4	72.5	104.0	IV	71.2	140.4	72.1	101.2		62.3	160.5	50.5	81.0
1888 I II III IV	70.5	141.8	71.9	101.9	I	69.7	143.4	67.4	96.6	1896 I II III IV	60.3	165.8	46.4	76.9
	68.5	145.9	69.4	101.3	II	68.5	145.9	65.8	96.0		62.2	160.7	50.0	80.3
	70.3	142.2	69.8	99.2	III	67.3	148.5	63.2	93.9		63.2	158.2	50.0	79.1
	72.8	137.3	70.4	96.7	IV	67.7	147.7	64.0	94.5		62.3	160.5	50.5	81.0

For greater clearness, the commodity values of gold and silver are presented upon the accompanying chart. It is apparent that the movement in the line of gold is far more regular than the rapid fluctuations in the value of silver. When these quarterly fluctuations are included in the computation, it is evident that the advantage of silver in relative stability of value will disappear, especially since this period includes the rise in silver in 1889-90, and the subsequent fall.

We shall take the sum of the variations from the mean for each year, for the first five years, and for the last six years. The sum of the yearly variations from the mean average of the four quarters of each year is 58.6 points, or 38.9 per cent, for gold, and 77 points, or 91 per cent, for silver.

Year.	Total variations from the mean in gold. Points.	Per cent.	Base.	Total variations from the mean in silver. Points.	Per cent.	Base.
1885 . . . .	5.2	3.7	138.9	1.8	2.0	110.8
1886 . . . .	3.6	2.4	144.1	8.4	7.8	107.5
1887 . . . .	5.6	6.9	146.5	7.8	7.2	107.1
1888 . . . .	9.8	3.8	141.8	6.3	6.3	99.7
1889 . . . .	4.1	2.0	138.0	2.0	2.0	96.7
1890 . . . .	4.1	2.9	139.2	19.9	18.1	109.5
1891 . . . .	2.7	1.9	139.5	5.2	5.0	102.7
1892 . . . .	6.9	4.7	146.3	4.2	4.4	95.2
1893 . . . .	4.1	2.7	147.1	19.6	23.3	84.0
1894 . . . .	11.7	7.3	158.7	6.3	8.3	75.1
1895 . . . .	9.0	5.5	161.3	5.3	6.6	79.3
Totals . . .	58.6	38.9	. . . .	77.0	91.0	. . . .

It is perfectly evident that over short periods gold is more stable, and, indeed, enjoys a decided advantage over silver. When the quarterly fluctuations are taken over long periods, the advantage of gold is more marked. The mean



variation of gold from 1885 to 1889 is 62.3, and of silver 101.3; from 1890 to 1895 the mean variation of gold is 188.4, or 78.7 per cent, and the mean variation of silver is 266.9, or 340.9 per cent. It is necessary to note that this second period can hardly furnish a fair basis of comparison, owing to the legislation affecting silver which was then enacted. It is evident, however, that when the movements of the two metals over short periods are taken into account, gold enjoys a decided advantage over silver.

The same results expressed in another form are to be obtained by counting from year to year and from quarter to quarter; and taking the sum of the difference thus obtained as a measure of the relative stability of the two metals. It will be unnecessary to go outside of Sauerbeck's tables to prove the accuracy of this conclusion. The sum of the yearly differences from 1873 to 1895 is 92.3 for gold and 93.5 for silver. The quarterly movements show an even greater advantage in favor of gold. The sum of the quarterly differences from 1885 to 1895 is 92.4 for gold and 116.9 for silver. It is evident that the movement of silver over short periods has been more irregular than the movement of gold.

Our investigation is now complete. Although not including all the elements of the problem, it is believed that the wide field included in our study will free it from those objections which rest upon a preference for one or another method of measuring the variation in prices. The same result, though less pronounced in some cases than in others, has been reached by both methods of investigation upon all the available material. The result and conclusion is that over periods comprising several years, the value of silver is more stable than the value of gold, while over short periods, that is from quarter to quarter, gold is more stable than silver.

The explanation of the relative stability of silver over long periods is found in the same influences which have

made silver so unstable over short periods—in the peculiar conditions which the general adoption of the gold standard has introduced. The transition has involved: (1) A gradual reduction of silver to the position of a commodity, and (2) a steadily increasing demand for gold. The value of silver, although up to 1886 it tended to increase, has kept very closely to the base line of commodities until the great fall in 1893. As a commodity, its value has been subject in a large measure to the same influences which affect all commodities, and over long periods it could not, therefore, greatly change its relative position. At the same time, for the last quarter century, silver has been the centre of a world-wide controversy. Its value has been profoundly influenced by frequent acts of legislation which have increased or diminished its demand, by monetary conferences and commissions, by apprehensions of unfavorable legislation, and by unfulfilled hopes of free coinage. The market value of silver has been subject to a multitude of peculiar influences. The silver market has long been a place of apprehension and uncertainty in which the ebb and flow of discussion and legislation has been registered in rapid price changes which have reacted on its value.

The value of gold has been entirely free from these influences. No doubt has ever been entertained that a demand would be found for all the gold that could be produced. Nay, more, the supply of gold has constantly fallen behind the demand at former values, and, as a result, the value has steadily risen. The gold miner has not been able in the past, and cannot to-day surpass the ever-increasing volume of business which is offering more and more for each ounce of his product. Almost all the movements in the line which represents the value of gold have been in one direction, and have been subject only to the infrequent disturbances of panic, which, for the time being, intensify the upward movement. In general, however, the movement has been steady. The pressure upon gold, though severe, has been

constant, and the gold line shows none of the extraordinary perturbations to which legislation has subjected the value of silver. The distinction between the metals in respect to their relative stability of value lies simply in the fact that one has been gradually taking the place which was formerly occupied by both. This distinction explains the facts with which this paper has been concerned. The value of gold, over long periods, measured by whatever method, has diverged more widely from the base line of commodities than the value of silver, because the movement in gold has been all in one direction, a steady advance in value, while silver rises only to fall again, and has constantly tended toward the values of all other goods. Conversely, over short periods, the steady movement of gold, compared with the rapid fluctuations in silver, makes gold more stable in value. If the criterion be accepted which was laid down at the outset of the discussion to determine the suitability of a metal to serve as a standard of deferred payments, the evidence which we have examined indicates that silver is preferable to gold because its value changes less over extended periods. Some important qualifications must, however, be made. This evidence is to a large extent vitiated by the peculiar monetary conditions which have just been noticed. These conditions greatly impair the value of any conclusion which is based upon the movement of gold and silver values since 1873, and which at the same time refers to a situation where those conditions will not be present. I refer, for example, to the proposition that because silver has shown itself to be more stable than gold, the United States should adopt the single standard of silver by coining silver at such a high ratio as to exclude gold from circulation. The advocates of such a policy are not justified in advancing the relative stability of silver since 1873 as an argument in their favor, since the conditions which produced that relative stability, in the event of free coinage would no longer be present, or, at any rate, would

be of much less importance. The pressure upon gold would be greatly lessened, while the supply would, to some extent, be increased. This would tend to check the advance in the value of gold, since more would be available to satisfy the demands of those nations which still adhered to the single gold standard. On the other hand, silver, at least in the United States, would take the position which gold now holds. Silver would cease to be a mere commodity, and would become, in the broadest sense of the term, a money metal. Its demand would be greatly increased, and the influences affecting its value would tend much more closely to approximate to the conditions which affect the value of gold. Under these circumstances, it is impossible to believe that silver would maintain the advantage over gold, in respect to stability of value, which it now enjoys.

If silver is more stable than gold, the causes of its stability must be sought in the conditions of the production of the two metals. We gain, however, but little confirmation from this evidence of the relative stability of silver. It has been held by Suess and by other writers of less note that the value of silver was more stable than the value of gold because silver occurred in larger masses and because its production was concentrated in fewer hands, which made possible a more careful adaptation of the supply to the demand. This conclusion is not in accord with recorded facts of the production of the precious metals. The annual supply of silver, when examined in detail, according to locality, has shown no greater regularity than the production of gold. Furthermore, although the vein of gold is, as a rule, much smaller than the vein of silver, the value of the unit of product from the first mentioned is many times greater, and this should fully offset the influence of the larger deposits of silver. At present the number of silver mines in operation in the United States is far less than the number of active gold mines, but this discrepancy arises very largely from the low value of silver and the

resulting depression which has closed down most of the important mines that must rely exclusively upon silver to pay expenses and dividends. Under normal conditions, the difference is not more considerable than we should expect from the low relative value of silver which confines its production at all times to ores much higher in the scale of productiveness than the scanty deposits which the gold miner may profitably exploit. The evidence, so far as it goes, is not favorable to silver.

There is one point, however, which, though sometimes remarked by the technical writers, is deserving of more than the scant attention which it has received from economists. Silver is found in connection with several other metals, especially with copper and lead, and to a large extent its supply is controlled by the conditions which directly affect these metals. The production of copper and lead tends very quickly to sympathize with any industrial advance, though less rapidly than the production of iron, which they closely follow, notwithstanding. Since silver is produced to so large an extent in connection with these metals, its production tends to increase at the time when an increase in the basis of credit, the medium of exchange, and to some extent the industrial consumption is demanded by the condition of business. Conversely, though to a less extent, since a level of production once reached is generally maintained in times of depression the production of silver will tend to decrease as copper and lead mining grow less profitable. Gold is influenced by the movement of its relative value, but since there is not the same physical connection between gold and other metals, its production does not fluctuate with the course of business to the same extent as the production of silver. There is no desire to elevate this distinction between the two metals into much present importance, because the general employment of the single gold standard by those nations in which these periodic demands for money are chiefly felt deprives silver of the

regulation of the monetary demand, in the absence of which, as recent experience has shown, a sustained supply of silver, due in largest measure to higher values of lead and copper, has only intensified the fall in its value. With free coinage of both metals, however, the full effect of this distinction between the conditions of production of gold and silver would become operative, and to some extent, how great it is naturally impossible to state, would tend to keep the value of silver more stable than the value of gold.

With this exception, then, there is nothing in the conditions of production of the precious metals to warrant an opinion that under the same conditions of demand, which is the only situation in which a comparison is comparable, silver is more unvarying in value than gold. It is well to emphasize the fact that the relative stability of silver since 1873 gives no reason to conclude that this advantage would be maintained under different conditions. Even if silver did show itself to be more stable than gold, its superiority in any event would be slight.

It is pertinent to our inquiry to remark in conclusion that the adoption of a silver standard by the United States would probably result in greater stability of prices than has been the case since the gold standard has been adopted. The argument leading to this conclusion is plain. The world's medium of exchange rests ultimately upon a metallic basis. As business increases, the basis of credit and currency must eventually enlarge or prices must fall in order that the same amount of money may perform more work. This readjustment, as seen from our own experience, if long continued, is attended with a severe fall of prices, and this results in extensive variations in the value of the standard of deferred payments. It is evident, then, that the more easily the basis of credit can be expanded to meet the increasing demands which are constantly being thrust upon it, the more unvarying will be the price level, the greater the stability of the standard. This position is axiomatic and will

be immediately accepted. Now it is evident that the larger the area of supply from which this metallic basis of credit can be drawn, the greater will be the facility with which it can be accommodated to the fluctuating demand. If both gold and silver mines could be drawn upon to furnish the world's standard metal, it is certain that the area of supply would be greater than it is at present, when gold alone is the standard. If, then, the action of the United States in opening the mints of this country to the free coinage of silver, no matter at what ratio—the ratio is of no present consequence—would have the effect of enlarging the area of supply, and this result will hardly be questioned, the conclusion inevitably follows that free coinage by the United States would conduce to greater stability of the standard. There is one possible exception. If the supply of the precious metals under such a regime should increase more rapidly than the production of other commodities, prices would rise, and the value of the standard might be altered to the prejudice of the creditor class. Such a result, though conceivable, is not within the bounds of probability. The experience of the period 1850-1865 is in point. During these years the world's gold supply was doubled, and yet the value of gold fell at the extreme only 18 per cent, and very quickly recovered much of the ground which it had lost. Production and trade expanded with such rapidity that the gold supply soon proved insufficient to sustain the price level. The reason for this lies on the surface. A fall in the value of the standard indicates that the business of its production is becoming relatively unprofitable. The result is a transference of capital and labor, an increase of energy in other lines of production, and a diminished activity in the mining of the precious metals. It is highly improbable, therefore, that in the presence of this regulating force, the value of the precious metals, even when both were generally used as standard money, could, for a very extended period, continue to decline. The relative disadvantage in

their production which would thence result would cause a restoration of the equilibrium by increased activity in other lines and by a relative decrease in the production of gold and silver. It is clear, therefore, that free coinage by the United States would conduce to greater stability of prices. The same result would be much more effectually attained by an international agreement.

It is no part of this study to deal with economic gerundives. We are safe in speaking of what has been, and of the future under assumed conditions. When an attempt is made, however, to apply these conclusions to the present day situation, we must dissent. The stability of prices is only one of a multitude of considerations which have influenced, and which will continue to influence, our monetary legislation. Against this advantage, we must set off the disadvantage of a standard differing from other commercial nations. An international agreement would obviate this difficulty, but that is too far in the future to reason upon its existence. There is also the insurmountable objection that free coinage by the United States is proposed with conditions against which the moral sense of the majority revolts. As long as the proposal of the advocates of silver in the United States is coupled with even the suggestion of unfairness to any class; as long as their propaganda is, even in the slightest degree, tainted with doubtful business morality, so long, it is safe to say, the gold standard will be retained; and with all its inconveniences, some of which have been most grievously exaggerated, compared with the present alternative, the gold standard is certainly to be preferred.

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